UNIVERSITY OF PENNSYLVANIA HEALTH SYSTEM

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Results of comparing Ms. Montgomery's PET values to New and Old Scanners where raw data are available

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Fred Duchardt, Esq.

Dear Mr. Duchardt:

As you requested, I am writing to summarize my analyses of the available data comparing her values to our normative samples of healthy women. We have the cpp data for 15 of the 23 women studied in the old scanner, and for 7 healthy women studied with the same scanner as Ms. Montgomery. The Figure below shows the means and standard deviations of the three samples (15 women from the old scanner with cpp available, 7 women from the new scanner, and the originally presented graph for 23 women, of which 15 are a sub-sample).

As can be seen, even if we apply the criterion of 2SDs, and use the sample with the most conservative estimate, we find 10 regions significant at that level. The probability of identifying this many regions as deviating from healthy in a normal person, when we expect 5%, was calculated by Dr. Bilker using an exact binomial test to be 0.00000745381, which is exceedingly low (1 in 134,160 women). As can be seen in Table 1, when comparing to women from the old scanner for whom raw cpp values are available, several regions have values that are highly unlikely in healthy women. The abnormal areas include all the main regions that I emphasized in my earlier reports.

To recapitulate the history of this debate, in my original report, I pointed out clinically significant elevations clustering in three main groups of regions: visual cortex, limbic structures, and somato-sensory areas. These regions relate meaningfully to her behavior and are consistent with her diagnosis. Drs. Evans and Mayberg argued that I have used different methods for calculating Ms. Montgomery's and the control sample, specifically that I used the whole-brain cpp values for calculating regional ratios for Ms. Montgomery and the average of 36 regions for the control sample. They requested the raw (cpp) data for her and the controls to test their conjecture, and these data were immediately provided for Ms. Montgomery and are now available for 15 of the 23 controls . The re-analysis of these data has shown that they are similar to (indeed, barely distinguishable from) those in my original report, sustaining the main conclusions as stated here. A second objection by Dr. Mayberg

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was that control data collected from a different scanner are inappropriate. We provided the raw cpp data on a sample of women studied on the same scanner as Ms. Montgomery, and these results demonstrated clinically and statistically significant abnormalities in Ms. Montgomery's PET scans. The abnormal elevations were in these same regions.

Thus, while there could be reasonable disagreement among experts on what these abnormalities mean, there is no doubt that Ms. Montgomery's PET results are abnormal. I believe the most robust and relevant data are those obtained from the same scanner, and propose to present these data setting aside the data from the old scanner so as to minimize confusion. Please let me know if you have questions.

Sincerely,

Ruben C. Gur, Ph.D.

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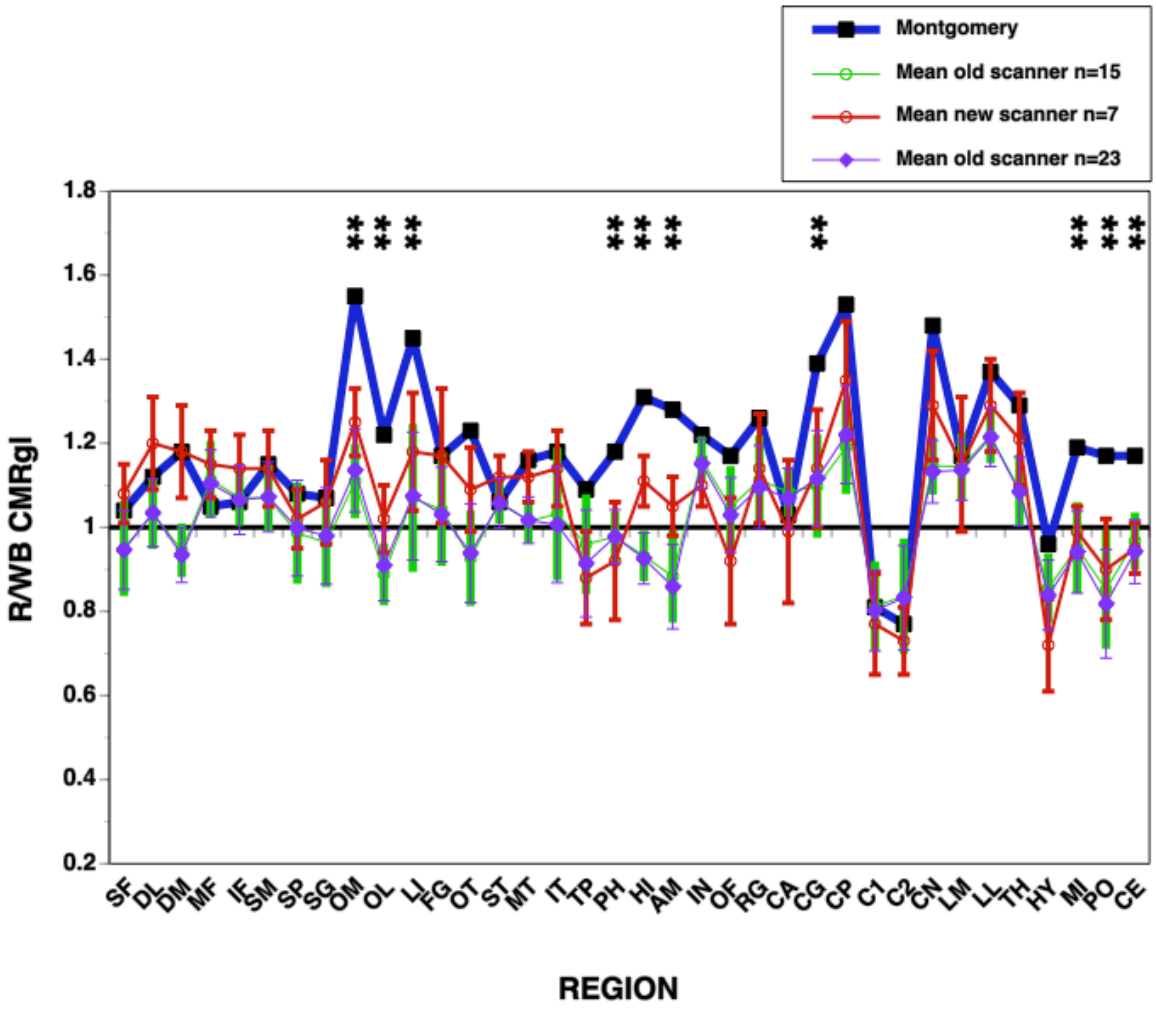

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Table 1. Ms. Montgomery's R/WB values (column 2) compared with means (column 3) and Standard Deviations (SD; column 4) of healthy women studied with the old scanner and for whom raw data are available (n=15). Column 6 and 7 contain information helpful for statistical interpretation of the results by showing the probability that a healthy woman will have the value recorded in Ms. Montgomery or higher (the right tail area of a normal distribution) and 1 out of how many healthy women will show that value or higher, respectively.

Region	Montgomery	Healthy women	SD	Z-score	Pr value in a healthy woman	1 out of
SF	1.04	0.95	0.11	0.80	0.21185539858	5
DL	1.12	1.03	0.08	1.04	0.14916995033	7
DM	1.18	0.95	0.06	3.68	0.00011661698	8575
MF	1.05	1.11	0.09	-0.69	0.75490290633	1
IF	1.06	1.07	0.07	-0.16	0.56355946289	2
SM	1.15	1.07	0.08	1.02	0.15386423037	6
SP	1.08	0.99	0.12	0.78	0.21769543759	5
SG	1.07	0.96	0.11	1.00	0.15865525393	6
OM	1.55	1.11	0.09	**5.01**	0.00000027215	3674442
OL	1.22	0.89	0.07	**4.52**	0.00000309198	323417
LI	1.45	1.07	0.18	**2.16**	0.01538633478	65
FG	1.17	1.04	0.13	0.96	0.16852760747	6
OT	1.23	0.93	0.11	**2.67**	0.00379256235	264
ST	1.06	1.06	0.05	-0.02	0.50797831372	2
MT	1.16	1.01	0.05	**2.80**	0.00255513033	391
IT	1.18	1.03	0.16	0.94	0.17360878034	6
TP	1.09	0.96	0.12	1.10	0.13566606095	7
PH	1.18	0.98	0.06	**3.27**	0.00053773742	1860
HI	1.31	0.93	0.06	**6.27**	0.00000000018	5539428428
AM	1.28	0.88	0.11	**3.59**	0.00016533898	6048
IN	1.22	1.16	0.06	1.06	0.14457229966	7
OF	1.17	1.05	0.10	1.24	0.10748769707	9
RG	1.26	1.11	0.11	1.40	0.08075665923	12
CA	1.03	1.08	0.06	-0.91	0.81858874511	1
CG	1.39	1.10	0.12	**2.37**	0.00889404263	112
CP	1.53	1.19	0.11	**3.03**	0.00122276869	818
C1	0.81	0.81	0.11	-0.02	0.50797831372	2
C2	0.77	0.84	0.14	-0.48	0.68438630348	1
CN	1.48	1.15	0.07	**4.89**	0.00000050418	1983419
LM	1.17	1.14	0.08	0.32	0.37448416528	3
LL	1.37	1.22	0.07	**2.34**	0.00964186995	104
TH	1.29	1.09	0.08	**2.37**	0.00889404263	112
HY	0.96	0.86	0.08	1.26	0.10383468112	10
MI	1.19	0.95	0.11	**2.19**	0.01426211841	70
PO	1.17	0.85	0.14	**2.25**	0.01222447266	82
CE	1.17	0.97	0.07	**2.96**	0.00153819521	650